UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

Specimen for 2007 (version 2)

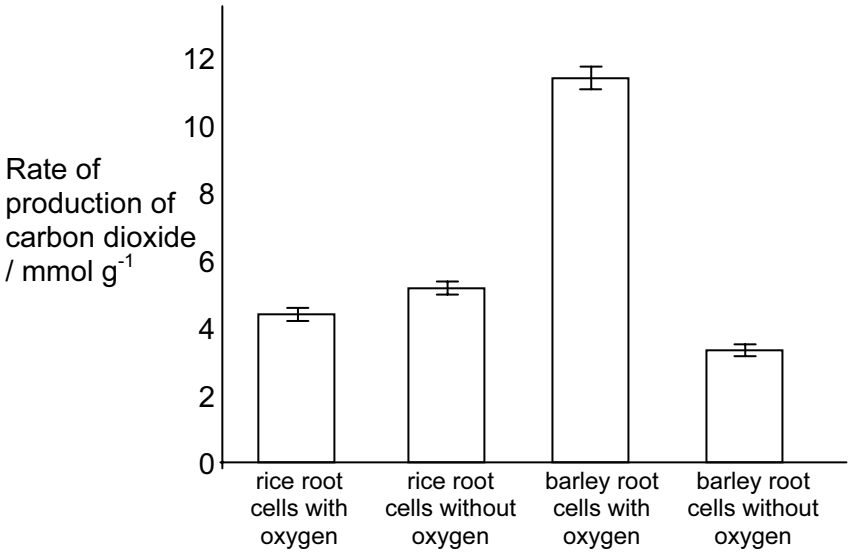
GCE A LEVEL

MARK SCHEME
MAXIMUM MARK: 30
SYLLABUS/COMPONENT: 9700/05 BIOLOGY PLANNING, ANALYSIS AND EVALUATION

Question			Expected answer	Mark	AO
1	(a)	(i)	As the concentration of carbon dioxide increases the rate of photosynthesis increases (until another factor becomes limiting);	1	P
		(ii)	*Independent:* concentration of carbon dioxide/hydrogen carbonate solution; *Dependent:* Volume/amount of gas/oxygen collected; *Accept*, rate of photosynthesis	2	P
	(b)		any 5 of: ref. to a range of hydrogen carbonate solutions of known concentration; *Accept*, ref. to expose to atmosphere with different known concentrations of CO_2 ref. to gas syringe plunger fully inserted; ref. to inserting stopper **after** attaching syringe; ref. to equilibration time before measuring any gas produced; ref. to reading volume after specific time; time to collect stated volume; ref. to repeating each measurement; AVP (e.g. detail of means of ensuring that gas syringe is read accurately/consistently);	5	M
	(c)		identification of 4 appropriate variables; quantity of aquatic plant – same mass/number of leaves/same plant; volume of test solution – same volume of each concentration; temperature – immerse the test solution in water bath at same temperature/use an air conditioned room; light intensity – use same light source at same distance from plant/means of controlling and measuring light intensity (in dark room/enclosed box); wave length – use same light source with same voltage/current/power/light temperature	1 4	P M
	(d)		1 of: gases dissolved in the pond water are removed/only gases from the plant are collected; microscopic plants that may use carbon dioxide are killed;	1	M

(e)	1 of: hazard associated with hydrogen carbonate solution; hazard assocaiated with the source of the pond water;	1	P
			5P
		Total 15	10M

Question			Expected answer	Mark	AO
2	**(a)**	**(i)**	0.14;	1	D
		(ii)	barley root cells with oxygen is less reliable than the others;		
			spread of data /standard deviation/standard error is greater;	2	D
			OR		
			significant difference between (all of/any of) treatments;		
			error bars do not overlap;		
		(iii)	axes correct orientation and labelled;	1	D
			all plots correct (means 4.5,5.5,11.4,3.3);	1	D
			error bars plotted from standard error;	1	D
			error bars correctly placed and plotted;	1	D
			(allow error carried forward if standard deviation used)		



	(b)		3 of ref. to: rice without oxygen grows better than rice with oxygen; rice is adapted to grow in anaerobic/water logged conditions, grows better than barley without oxygen; rice can tolerate the ethanol produced by anaerobic respiration/barley seeds killed by ethanol produced by anaerobic respiration; aerobic respiration releases more energy than anaerobic, barley grows faster/more with oxygen;	3	C
					7D
			Total	10	3C

Question	Expected answer	Mark	AO
3 (a)	$\frac{(7.5-6.2)}{6.2}\times 100=\frac{1.3}{6.2}\times 100=0.21\times 100=21\%$;		
	accept 21.0% or 20.97% reject 45% as obvious but incorrect	[1]	
(b)	*support* mean value of experimental cell culture is higher (than control); bottom or range higher / top of range higher, in experimental cell culture (than control) / AW;		
	does not support range overlaps / ref. to specific examples of control and experimental samples which are the same (e.g. control 6 and experimental 8 which are both 6.5);		
	ref. to possible anomalies / specific named anomaly from the list experimental samples 4 or 7 / control samples 3 or 5 or 10;		
	ref. to insufficient replication (for such variable data);		
	no statistical test of difference carried out / do not know if the difference is significant / no chi squared test / no t-test / no standard error bars plotted;		
	only one concentration tested / ref. limited range / AW;	[max 4]	